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ABSTRACT

This paper attempts to describe various details of the tonal system of Hausa within the framework of generative phonology. Aspects of tone in Hausa are discussed under the following headings: low tone raising, low-high rule, falling tones and the evaluation measure, tone deletion, and derived nouns and adjectives. Where specific proposals are presented arguments are given which make explicit the author's reasons for believing that phonological theory must value these proposals more highly than conceivable alternatives. The author notes that for the purposes of the present paper the issue of rule ordering is largely ignored and "underlying forms" discussed are assumed to be as close to surface realizations as possible. [Not available in hard copy because of marginal legibility of original document.] (FWB)

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THE MORPHOPHONEMICS OF TONE IN HAUSA

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0. INTRODUCTION

The rich mechanism provided by the framework of generative phonology makes possible any number of descriptions of a given accentual system; minor rules and exception features provide an easy way to make any arbitrary proposal work. But, as in all facets of linguistic description, the important thing is somehow to show that one proposal is more highly valued than other proposals that might be entertained. What makes this task especially difficult in the description of accentual phenomena is that here the notion of rule naturalness is even more poorly understood than in segmental phonology, underlying forms are hard to justify, and boundary markers, which can be used to determine the scope of application of rules, are difficult to motivate independently.

In this paper[1] I will attempt to describe various details of the tonal system of Hausa. With each specific proposal, I will make explicit my reasons for believing that phonological theory must value it more highly than conceivable alternatives. For methodological purposes, I will assume that underlying forms are as close to surface realizations as possible, except where such an assumption would miss an obvious generalization. The reader should be cautioned that where I refer to 'underlying form,' I am not necessarily making a claim about its most abstract representation, but only about its shape at some earlier stage in the derivation.

The term 'syllable' is used rather loosely in this paper to refer to units of the form CV(V)(C) even at early points in the

phonology, before the syllable is actually well defined.

Long vowels are expressed as geminate short vowels. Tones are noted in the following way: given the form Cvv for a long open syllable, the sequence Cv́v is to be interpreted as a level high tone, Cv̀v as a level low tone, Cv̂v as a falling tone.

The issue of rule ordering is largely ignored. By inspection one can see that the assumptions made is some sections about the ordering of rules are not contradicted by other aspects of the analysis; defininitve arguments for the ordering of rules will have to await determination of the status of some of the rules proposed here and examination of a broader range of data.

1. LOW TONE RAISING

Typically in Hausa, the direct object personal pronoun is polarized with respect to the last syllable of an immediately preceding finite verb. This is illustrated by the following examples, where the pronoun shi, 'him,' has a high tone when the preceding syllable is low, and a low tone when the preceding syllable is high:

(1) a. náa káamàa shí 'I seized him' (Grade 1)

b. náa tàmbàyée shì 'I asked him' (Grade 2)

c. náa káamèe shí 'I captured him' (Grade 4)

d. náa káawóo shì 'I brought it' (Grade 6)

However, polysyllabic verbs of Grades 1 and 4 appear to behave exceptionally:

(2) a. náa kàràntáa shí 'I read it' (Grade 1)

b. náa kàràncée shí 'I read all of it' (Grade 4)

Here the object pronoun is high in tone, even though the preceding syllable is high. These apparent exceptions could be eliminated by treating the last syllable of the polysyllabic verbs in (2) as having an underlying low tone, àa, just like the disyllabic verbs of the same grades (see examples 1a and 1c). The polarization rule would convert underlying kàràntàa shi and kàràncèe shi into kàràntàa shí and kàràncèe shí, respectively, and then the tone of the final syllable of these polysyllabic verbs would be raised by a subsequent rule:

(3) LOW TONE RAISING

$$L \begin{matrix} L \\ [+Long] \end{matrix} \# \longrightarrow L \begin{matrix} H \\ [+Long] \end{matrix} \#$$

, where L refers to a low-toned vowel, H to a high-toned vowel.

This rule converts a sequence of two low tones at the end of a word into a sequence of low tone plus high tone, when the final syllable contains a long vowel. There is independent evidence for such a rule in Hausa. The following is a brief but representative sampling of Hausa nouns whose last two syllables are low in tone:

(4) a. tálàkà 'poor man'

b. káarùwà 'prostitute'

c. fúrsùnà 'prisoner'

d. àbù 'thing'

e. àkwàatì 'box'

Much checking with informants and with sources that mark a long-short distinction on final low-toned vowels (the Hausa dictionaries

do not) reveals no word in Hausa which ends in two low-toned syllables, the last of which contains a long vowel.[2] This is not an accidental gap in the data; later sections of this paper will show that rule (3), Low Tone Raising, is indispensable to the treatment of various derivational processes in Hausa.

Even granting the existence of Low Tone Raising in Hausa, it remains to be shown that this rule applies to the verbal forms káràntàa and káràncèe. Clearly, polysyllabic verbs of Grades 1 and 4 can arbitrarily be assigned these underlying forms, but a truly convincing analysis will show independent reasons for doing so. Consider the following paradigm.[3] The letters A, B, and C at the head of the columns refer to the environments in which the verbs appear: B forms appear before a direct object pronoun, C forms before a direct object noun, A forms elsewhere (with some exceptions that are irrelevant here).

TABLE I.

	A	B	C
Grade 1	káamàa káràntáa	káamàa káràntáa	káamà káràntà
Grade 2	sàyáa tàmbáyàa	sàyée tàmbàyée	sàyí tàmbàyí
Grade 4	káamèe káràncée	káamèe káràncée	káamè káràncè
Grade 6	káawóo kíráawóo	káawóo kíráawóo	káawó kíráawóo

(The term 'grade' refers to an inflectional class. The missing grades, 3, 5, and 7, occur only in environment A and so are of no interest here.)

In each grade, the C form differs from the others in that its ending is short. It is thus reasonable to assume that there is

a morphological rule which shortens the verbal ending in environment C (or, alternatively, lengthens it in environments A and B). But there remains another discrepancy--polysyllabic verbs of Grades 1 and 4 end in a high tone in A and B but in a low tone in C. If we are to maintain that, for any verb in a given grade, there is a regular relationship between the A and B forms on the one hand and the C form on the other, as the rest of the data seems to suggest, then it is necessary to posit the same underlying tonal pattern in environments A and B as in C. Thus, for polysyllabic verbs of Grades 1 and 4, we have two alternatives: either the underlying tone pattern is HLH, and a rule makes the final syllable low in environment C, or the underlying tone pattern is HLL, and a rule makes the final syllable high in environments A and B. The reasons for choosing the latter alternative should now be clear: the rule needed to raise the tone of the final syllable of polysyllabic verbs in Grades 1 and 4 is independently motivated, and postulating an underlying tonal pattern of HLL on these verbs allows us to explain the polarization phenomenon in (2), to which precisely these verbs appeared to be exceptions.

Note further that as a consequence of this analysis we can associate with each grade an inflectional ending whose tone is independent of the number of syllables of the verb root to which it is attached. For example, the Grade 1 ending is -àa, Grade 4, -èè, Grade 6, -óo. The lexical entries for the verb roots can be left unspecified for tone; a tone pattern is assigned to a verb root by a rule, which needs to know only the number of syllables in the verb root, and the grade number of the inflectional ending.

2. LOW-HIGH RULE

In this section I wish to establish the existence of the following rule:

(5) LOW-HIGH RULE

$$\overset{\frown}{LH} \longrightarrow H$$

(where the tie $\frown$ indicates that $\overset{\frown}{LH}$ are on the same syllable)

A. ɗáukàa

The verb ɗáukàa is, with one exception, identical in its behavior to the disyllabic verbs in Grade 2: in its finite form it takes the same endings and tone patterns as a normal disyllabic Grade 2 verb; its imperative is formed just like that of a Grade 2 verb; its verbal noun is not formed by adding the nominalizing morpheme, another characteristic of Grade 2 verbs. The first similarity noted can be observed by comparing the forms below in Table II with those given for Grade 2 in Table I.

TABLE II.

A	B	C
ɗáukàa	ɗàukée	ɗàukí

The only difference is that in the A form we have ɗáukàa instead of the expected *ɗàukáa. I will maintain that the only irregularity in the verb ɗaukaa is that it is treated as a three-syllable verb, even though its surface realization has only two syllables. Confirmation of this claim comes from its behavior with Grade 1 and 4 endings:

TABLE III.

	A	B	C
Grade 1	ɗáùkáa	ɗáùkáa	ɗáùkà
Grade 4	ɗáùkée	ɗáùkée	ɗáùkè

Comparison of the above with Table I reveals that ɗaukaa has in each case the same tonal pattern as a three-syllable verb, with two of the tones on the first syllable. If ɗáukàa is treated as a three-syllable verb in Grade 2, then its tonal pattern in the A environment will be like that of tàmbáyàa: ɗàúkàa. (The B and C forms will have two low tones on the first syllable, which will be interpreted by convention as a single low tone a syllable.) The realization of ɗàúkàa as ɗáukàa provides evidence for (5), the Low-High Rule.

B. Contractions

Additional support for this rule comes from the following data, cited in Parsons (1960) for the Sokoto dialect. The verb and direct object pronoun in the left column optionally contract to produce the form to the right of the arrow.

(6) a. yáa káamàa shí ⟶ { yáa káamás / yáa káamái } 'he seized him'

b. sún káshèe tá ⟶ sún kássát 'they killed her'

c. án zàaɓée ni ⟶ án zàaɓáǹ 'I was chosen'

Example (6c) shows clearly that the tones on the two syllables to be contracted both appear on the resulting single syllable. It is natural to expect that the same thing happens in (6a) and (6b), the only difference being that the result low-high sequence on the contracted syllable is realized as a high tone, by rule (5).

C. jìmíllàa

Another bit of evidence for this rule comes from the word jìmíllàa, 'total,' which has a contracted form, jímlàa. Here, contraction has collapsed the first two syllables into one, and rule (5) converts jĭmlàa into jímlàa.

3. FALLING TONES AND THE EVALUATION MEASURE

This section treats three classes of nouns which violate what might be regarded as a morpheme structure condition of Hausa--that no syllable may bear more than one tone in its lexical representation. It should be clear from the discussion in the preceding section that the sequence $\widehat{LH}$ on a single syllable is not a permissible surface realization in Hausa; but $\widehat{HL}$ is a permissible sequence, and it is generally realized as a falling tone. Example (6c), repeated below, shows how a falling tone arises from the contraction of a high and a low syllable:

(6c) án zàaɓée ni̇ ⟶ án zàaɓáǹ

There are some fairly clear instances of falling tones in Hausa which cannot arise (synchronically, at least) from a process like contraction, but which must instead be marked as falling tones (that is, as a $\widehat{HL}$ sequence on what underlies a single syllable) in the lexicon. Some examples are given below in the left-hand column:

(7) a.	kúǹnée	'ear'	e. hánnúu	'hand'
b.	yáǹmáa	'east'	f. támmáa	'one franc'
c.	láỳfíi	'fault'	g. fáyfáy	'circular mat'
d.	tsúǹmáa	'rag'	h. kúmmá-kúmmá	'in batches'

The tonal pattern of the words on the left is very rare for two-syllable words, while the words on the right have a normal pattern. Assuming that the lexical entry for a Hausa noun lists the stem (e.g., hánn, for hánnúu; támm, for támmáa), and that a lexical feature specifies which suffix occurs with it (e.g., -úu for hánnúu; -áa for támmáa), the entries for the words in the left-hand column of (7) are irregular in that they contain only one vocalic nucleus, but have a sequence of two tones on them.

There are two other classes of nouns in Hausa which, I will claim, are irregular in the same way-- a single vocalic nucleus has two underlying tones on it. These cases are somewhat more complex, and discussion of them entails an understanding of the behavior of the genitival link, n.[4] Below, the normal case is illustrated:

(8)	Isolation form	With genitival link	
a.	hánnúu	hánnún	'hand'
b.	gùmíi	gùmín	'warmth'
c.	áykìi	áykìn	'work'

Addition of the genitival link causes no change in the tone of these words; the only change is the shortening of the vowel, which occurs without exception in Hausa in any closed syllable.

There are some words which, though regular in their tonal structure, are irregular in that their isolation forms may end in a consonant:

(9) Isolation form	With genitival link	
a. óofìs / óofìshíi	óofìshín	'office'
b. téebùr / téebùrîi	téebùrín	'table'

To account for the alternation is the isolation forms of (9), one must have either a minor rule which deletes the ii of óofìshíi and téebùrîi in some environments or a rule which adds ii to óofìs and téebùr in some environments. (A general rule palatalizes s before nonlow vowels.) Reasons for a choice between these two possibilities will be considered shortly.

The purpose of the above discussion was to give some background for the description of the following phenomenon, where certain nouns are irregular both in having isolation forms which end in a consonant and in containing a sequence of two tones on a single syllable.

(10) Isolation form	With genitival link	
a. mùtúm̀	mùtúmìn	'man'
b. àlhàmís̀ / àlhàmíshii	àlhàmíshìn	'Thursday'
c. hàráḿ	hàráamùn[5]	'forbidden thing'

Wherever the isolation form ends in a consonant, its final syllable has a falling tone; elsewhere the corresponding syllable is high. Clearly, except for the matter of the falling tones, (11) is to be handled in the same way as (10). Thus we have two proposals:

PROPOSAL A

Noun stems: a. mùtúm

b. àlhàmís

c. hàráam

d. óofìs

e. téebùr

Suffix: -ìi

A minor rule deletes the suffix -ìi from the isolation forms of (10) and (9), obligatorily for some words, optionally for others. When -ìi is deleted, its tone is placed on the preceding syllable; e.g., in the isolation form téebùr+ìi optionally becomes téebùr̀, which is changed by convention to téebùr; mùtúm+ìi obligatorily becomes mùtúm̀ in the isolation form, and the H͡L sequence on the final syllable is realized as a falling tone.

PROPOSAL B

Noun stems: a. mùtúm̀

b. àlhàmís̀

c. hàráàm

d. óofîs

e. téebùr

Suffix: none

A minor rule, applying to those words which have no suffix, inserts -ìi obligatorily before the genitival link, n, and optionally in some cases in the isolation form. For example, mùtúm̀ n becomes mùtúm̀+ìi n, and a rule of Tone Deletion, to be discussed in the next section, converts this to mùtúm+ìi n; téebùr n becomes téebùr+ìi n, which is subsequently converted into téebùr+íi n by Low Tone Raising. Finally, these words become mùtúmìn and téebùrín by the vowel shortening rule mentioned above.

Either of these proposals will obviously permit the generation of the correct exceptional forms. However, there are two considerations which suggest that Proposal B is superior to Proposal A. First of all, the two proposals make different claims about the language. Proposal A says, in effect, that a subclass of the Hausa nouns ending in <u>-ii</u> undergo a minor rule of <u>-ii</u> deletion. Most of the nouns that take the suffix <u>-ii</u> are not subject to this rule. Proposal A leaves open the question of why just a particular subclass of nouns ending in <u>-ii</u> should undergo this rule. Even granting the fact that languages have ad hoc rules which apply to some words and not others, it is still true that if some other analysis did explain why a particular set of words undergoes an ad hoc minor rule, that analysis would be more highly valued, all other things being equal. Proposal B is just such an analysis. It says, in effect, that Hausa has some nouns which are exceptional in that they do not require a suffix in the isolation form. The reason, then, that just these words are subject to a rule of suffix insertion in certain environments, is that they have no underlying suffix. Proposal B seems to make a more reasonable claim. A minor rule of suffix deletion is quite odd in a language where all nouns are taken to have suffixes; but a suffix insertion rule is not very odd in a language which has some exceptional words that can occur in isolation without a suffix.

Secondly, Proposal A makes the applicability of <u>-ii</u> deletion a completely idiosyncratic property of lexical items. <u>Téebùrìi</u>, 'table,' is marked to undergo the rule, while <u>líttáafii</u>, 'book,' is

not. However, there is a phonological constraint that prevents líttáafìi from becoming *líttá`f: the tonal sequence H $\widehat{HL}$ is impermissible in Hausa words.[5a] I can see no easy way in which this fact can be taken into account in Proposal A. It might be suggested that a marking convention automatically marks words with the tonal shape of líttáafìi as not undergoing -ii deletion; but such a convention would in effect duplicate the already existing morpheme structure condition of Hausa against H $\widehat{HL}$ sequences. I can see no way around this duplication in Proposal A. In Proposal B, on the other hand, the non-occurrence of the surface form *líttá`f is explained by virtue of the fact that *líttáàf is an impossible morpheme, since it violates the morpheme structure condition. There is no duplication here.

It seems that the only fact that might be cited in support of Proposal A is that it avoids the necessity of postulating an underlying falling tone on words like those in (10). But, as was noted above, there are words which in any analysis will be regarded as exceptional in this respect; furthermore, there are two reasons for believing that Proposal A is inadequate. Thus I conclude that Proposal B is correct, and that the words in (11) are additional cases in Hausa where two tones occur on what underlies a single syllable.

The last class of words that appear to have underlying falling tones is illustrated here:

(11)

Isolation form	With genitival link	
a. ráỳ	ráǹ	'life'
b. káỳ	káǹ	'head'
c. kyáẁ	kyáǹ	'beauty'

If the lexical representation of these words is basically as it appears in the left-hand column of (11), then no special rules are needed to account for the forms with the genitival link. The falling tone will be maintained, and the vowel shortening rule mentioned above will operate to produce the correct forms on the right.

Here, too, one might be tempted to consider an analysis along the lines of Proposal A. The underlying forms would be ráay+ìi, káay+ìi, and kyáaw+ùu, with a minor rule deleting the suffix in all environments, putting its tone on the preceding syllable. There is even some evidence that might seem to support such an analysis, for at least one Northern dialect of Hausa has ráayìi, káayìi, and kyáawùu in place of the forms in (11). It might be claimed, therefore, that Hausa dailects differ with respect to the applicability of this minor rule of suffix deletion. But there is no reason to expect that a child learning a dialect containing the words in (11) will invent a minor rule of suffix deletion, just in order to allow for underlying forms like ráay+ìi, káay+ìi, and kyáaw+ùu, for which there is no independent evidence in his dialect. Just as the evaluation measure cannot take into account historical accuracy of synchronic statements,[6] it cannot consider data from one dialect as crucial evidence for the analysis of another dialect. Although it turns out that dialects largely share the same underlying forms and differ mainly in the rules which relate them to phonetic forms, this cannot be assumed to be true in any particular case.

What the evaluation measure has to consider in the case at hand is the simplest way of representing an exceptional class of words. Given a choice between the two ways suggested above for marking these words as exceptional--that is, either representing a single syllable lexically as having two tones on it, or marking the words to undergo an ad hoc minor rule--the evaluation measure must choose the first. The reason is that the first way suggested for handling the words in (11) involves merely marking them as exceptions to a morpheme structure condition; the existence of other cases of this type of exception has been established independently, for (7) and (10). The second way involves marking the words in (11) to undergo a minor rule, and incorporating the otherwise unnecessary minor rule which they are to undergo. Clearly, the first proposal involves less ad hoc machinery and so is to be preferred.

4. TONE DELETION

A rule of Tone Deletion, alluded to in the previous section, is needed to convert the underlying sequences in (12) into the corresponding ones in (13):

(12) a. mùtúm̀+ìi b. àlhàmís̀+ìi c. hàráàm+ìi

(13) a. mùtúm+ìi b. àlhàmís+ìi c. hàráam+ìi

The rule is stated as follows:

(14) TONE DELETION[7]

$$[\overbrace{\alpha H}][-\alpha H]\ [-\alpha H] \longrightarrow [\alpha H]\ [-\alpha H]$$

This rule converts the sequences $\widehat{LH}$ H and $\widehat{HL}$ L into L H and H L, respectively. It is the operation of this rule, I will claim, that accounts for many of the apparent cases of tonal dissimilation that have been cited in Hausa. Consider, for example, the pronominal possessive forms:

(15) a. nàawá 'mine'

b. náasà 'his'

Each of these words contains (at least) two morphemes: naa, 'of,' and a personal pronoun form. There is independent evidence for an underlying high tone on wá (cf. -á in gídáaná) and for an underlying low tone on sà (cf. -sà in gîdánsà). Taking the underlying form of naa to be nàá, we have the following derivations:

(16)

a.		b.
nàá+wá		nàá+sà
nàa	(Tone Deletion)	
	(Low-High Rule)	náa
nàa+wá		náa+sà

The only alternative to this proposal would claim that the underlying form of naa is náa, and that it is subject to a minor rule of polarization: H + H ⟶ L + H. These two proposals differ in the way they treat the exceptional behavior of Hausa tone. The first says that naa is exceptional in that it has two underlying tones on it; the second says that naa is exceptional in that it is subject to a minor rule. The principle of evaluation proposed in the last section--that solutions which treat exceptions in a way independently established for the grammar in question are more

highly valued than solutions which require ad hoc statements, such as minor rules that are not independently motivated--suggests that the first solution is preferable to the second.

There is one objection to regarding naa as having two underlying tones that should be considered. When naa occurs before a noun, instead of a personal pronoun, it is shortened to na. It is reasonable to suppose that this shortening is accomplished by a readjustment rule, before the application of the phonological rules, since it is occasioned by a grammatical, not a phonological, context. What happens to the two tones of nàá when there is only one vowel to bear them? Clearly, in the case of the long vowels, which are analyzed as an underlying sequence of two short vowels, the first tone can be assoicated with the first vowel, and the second with the second vowel, as in Woo (1969). But when there are two tones and only one short vowel to bear them, the present framework does not provide a way of expressing this situation, since a single vowel cannot be marked with the contradictory features [+high tone] and [-high tone].

In the case at hand, however, I must assume that both tones remain on nà́, so that the Low-High rule will cause it to be realized as the correct ná. Several other considerations suggest that this problem results from an inadequacy, not in this particular analysis, but in the assumption that an underlying tone is specified as a feature of a particular phonological segment, rather than, say, as an independent prosodic entity. For one thing, words like àlhàmìs̀ and k̀à̀ttáa must be treated as if the low tone of the $\widehat{HL}$ sequence is a feature of a voiceless consonant. Besides being

phonetically implausible, this contradicts the assumption that only the vocalic nuclei of morphemes can bear phonological tone; if this assumption is abandoned, it will complicate the statement of tone assignment rules, which assign tone only to vocalic nuclei.

Another case which is difficult for the present theory to handle is the nominalizing morpheme `wáa, which must be regarded as having a low tone preceding it, not on it. When attached to a verb that ends in a high tone, it converts that high tone into a falling tone; it has no effect on verbs ending in a low tone, as in (17d):

(17) a. káràntàa#`wáa

áa (Low Tone Raising)

áà wáa (Tone Incorporation)

káràntáà#wáa

b. máydóo#`wáa

óð wáa

máydóò#wáa

c. máyár#`wáa

ár wáa (Tone Incorporation)

(Convention)

máyár̀#wáa

d. káamàa#`wáa

àà wáa

àa

káamàa#wáa

Some dialects have máyás#`wáa in place of (17c), máyár#`wáa. In this case, the second syllable still gets a falling tone: máyáswáa; this is another instance where the present theory forces us to regard a voiceless consonant as bearing the feature [-low tone].

Finally, when `wáa is attached to a short high-toned vowel (e.g., to yìyú, in yìyúwáa), it does not occasion a falling tone; rather, that

short vowel remains high. There are two possible explanations for this: either the rule which would incorporate the low tone of `wáa on the preceding vowel is blocked, since the preceding vowel, being short, can bear only one tone; or the rule actually places the low tone of `wáa on the preceding short syllable, giving it a $\widehat{HL}$ sequence, and a subsequent rule converts falling tones to high tones on short vowels in open syllables. I have no good reasons for choosing between these two possibilities; if the second is correct, then this is another case where two tones have to be specified for a single short vowel.

As a final point in this exposition of Tone Deletion, I will treat an apparent counterexample to the claim, implicit in the formulation of Tone Deletion, that the sequence $\widehat{HL}$ L does not exist as a surface form in Hausa. The forms below on the left enter into the corresponding possessive constructions on the right, where the genitival link, n, and the pronoun sà have been added to the isolation form:

(18) a.	ráỳ	'life'	ráñsà	'his life'
b.	káỳ	'head'	káñsà	'his head'
c.	kyáẁ	'beauty'	kyáñsà	'his beauty'

As things stand, the Tone Deletion rule would incorrectly remove the low tone that appears above n in the right-hand column. This would be prevented if the two low tones were separated by a word boundary, as in (19):

(19) a. ráỳ # n+sà

b. káỳ # n+sà

c. kyáẁ # n+sà

There is independent evidence for a word boundary in precisely this place. It will be shown later that certain nouns, such as jínjìrîi, 'baby,' and má'àykàcíi, 'worker,' have an underlying final low tone: jínjìrìi, má'àykàcìi. In their isolation forms, these words will get a final high tone by the Low Tone Raising rule. But they also need to have their final tone raised when they are followed by the genitival link, n, or the definite marker, ǹ.

(20)	Underlying form:	a. jínjìrìi	b. má'àykàcìi
	Isolation form:	c. jínjìrîi	d. má'àykàcîi
	With genitival link:	e. jínjìrîn	f. má'àykàcîn
	With genitival link and pronoun sà:	g. jínjìrînsà	h. má'àykàcînsà
	With definite marker, ǹ	i. jínjìrîǹ	j. má'àykàcîǹ

It might be proposed that the Low Tone Raising rule, which makes a word-final long vowel high when it is preceded by a low tone, should be restated, so that it would apply to long syllables, rather than long vowels. This restatement would account for the facts of (20a-h), as long as a word boundary appeared after the genitival link, n. But it does not account for (20i,j), nor for the following:

(21)	a. tálàkàn	'the poor man of...'
	b. tóocîlàn	'the flashlight of...'
	c. àkwàatìn	'the box of...'

The underlying vowel of the last syllable of the words in (21) is short. When the genitival link is added, the syllable becomes long, but Low Tone Raising must not apply. Therefore, it must be the case that Low Tone Raising applies only to long vowels, not to long syllables.

The words in (20e,f) show that Low Tone Raising applies before Vowel Shortening; otherwise Low Tone Raising would be incorrectly blocked. The words in (20g,h) show that there must be a word boundary either before or after the genitival link, so that the vowel before the genitival link will be raised by Low Tone Raising. The words in (20i,j) show that the word boundary must precede the definite marker, so that Low Tone Raising can apply.

I will assume that the word boundary is positioned before the genitival link in (20e-h) and in (19), rather than after it, because this is its position with respect to the definite marker. In either case, however, independent support has been established for a word boundary to block the application of Tone Deletion to the words of (19).

A possibility that has not been considered is cyclic application of the Low Tone Raising rule. If this rule applied cyclically below word level, all of the forms in (20) would be accounted for with no need for postulating word boundaries at all. However, it will be pointed out in Section 5 that the analysis there is incompatible with cyclic application of Low Tone Raising below word level.

5. DERIVED NOUNS AND ADJECTIVES

Hausa has a derivational process which creates the feminine form of many nouns and adjectives by attaching the suffix -aa to the masculine form. In the list below, the first column under the heading Feminine contains the underlying representations, and the right-hand column contains the corresponding surface realizations.

(22)

Masculine	Feminine		
a. ƙáat+òo	ƙáat+òo+áa	ƙáatùwáa	'fat'
b. shéeg+èe	shéeg+èe+áa	shéegiyáa	'bastard'
c. jàaríir+ìi	jàaríir+ìi+áa	jàaríiriyáa	'baby'
d. dàbíin+òo	dàbíin+òo+áa	dàbíinùwáa	'date palm'
e. gúrg+ùu	gúrg+ùu+áa	gúrgùwáa	'lame'
f. ƙànƙán+èe	ƙànƙán+òo+áa	ƙànƙánùwáa	'small'

The underlying feminine forms are related to their surface realizations by very general rules of glide formation and vowel raising whose precise formulation need not concern us here. In the feminine of (22f), the masculine suffix -òo replaces the -èe of the masculine form. The facts in (22) provide no evidence for determining the underlying tone of the feminine suffix -aa; although it appears as high, even if it were phonologically low, the Low Tone Raising rule would make it high in all the examples given above. Now consider the following:

(23)

Masculine	Feminine	
a. dóogóo	dóogúwáa	'tall'
b. dóolóo	dóolúwáa	'fool'
c. tsóofóo	tsóofúwáa	'old'
d. tsúntsúu	tsúntsúwáa	'bird'

These words may lead us to think that -aa has an underlying high tone, but in the following words, -àa is low.

(24)

Masculine	Feminine	
a. yáaròo	yáarínyàa	'boy; girl'
b. báràa	bárányàa	'servant'
c. bírii	bírínyàa	'monkey'
d. kíifíi	kíifányàa	'fish'
e. záakìi	záakányàa	'lion'

Assuming that -aa is the same suffix in (24) as in (22) and (23), it is impossible to maintain that this suffix has an underlying tone on it, for it its underlying tone were high, then the examples in (24) would require an ad hoc tone lowering rule; if its underlying tone were low, then an ad hoc tone raising rule would be needed for (23).

Therefore I propose that -aa has no underlying tone, but that its tone is assigned by a rule which copies the tone of the immediately preceding syllable. In (22), -aa will receive a low tone from the preceding syllable, and this tone will subsequently be raised by the Low Tone Raising Rule; in (23), -aa will receive a high tone from the preceding syllable. For (24), I will show that there is an underlying low-toned vowel immediately preceding -aa which is deleted after its low tone is copied onto -aa.

The evidence for a low-toned vowel preceding -aa in (24) comes from the following construction, which, I will claim, is closely related to that in (24).

(25)

Masculine	Feminine		
a. bàráaw+òo	bàráaw+nìi+aa	bàráwnìyáa	'thief'
b. sárk+íi (<sáráak+íi)	sáráak+nìi+aa	sáráwnìyáa	'chief'
c. màráay+àa	màráay+nìi+aa	màráynìyáa	'orphan'
d. sáà	sáa+nìi+aa	sáanìyáa	'bull; cow'
e. màkáaf+òo	màkáaf+nìi+aa	màkáwnìyáa	'blind person'

The feminine nouns in (25) are formed by adding the affixes nìi and -aa to the noun stem. The final consonant of the noun stem in (25b,e) becomes a glide,[8] and the long vowel of the consonant stem is shortened in a closed syllable. The tone of nìi is copied onto -aa, the rule of Glide Formation converts nìi to nìy, and Low Tone Raising converts -àa to -áa.

The feminines in (24) are formed on the same pattern as those in (25):

(26) a. yáar+nìi+aa

b. bár+nìi+aa

c. bír+nìi+aa

d. kíif+nìi+aa

e. záak+nìi+aa

For some reason the words in (26) differ from those in (25) in that in the former, the final consonant of the noun stem does not become a glide before n. Instead, a short vowel is inserted.[9] In (26a,c), á is inserted; in (26b,d,e), í is inserted. I will leave open the question of whether the conditions governing the quality of the vowel to be inserted are phonologically or lexically specified. This rule of Vowel Insertion changes the forms of (26) into the corresponding forms in (27):

(27) a. yáaŕí+nìi+aa

b. bárá+nìi+aa

c. bíŕí+nìi+aa

d. kíifá+nìi+aa

e. záaká+nìi+aa

In (27), just as in (25), the tone of nîi is copied onto -aa and Glide Formation converts nîi to nîy. Then, before Low Tone Raising can apply, a rule of Short Vowel Deletion removes î from nîy, producing the correct surface forms, which are repeated below on the right.

(28) a. yáarí+nîy+àa — yáarínyàa

b. bárá+nîy+àa — bárányàa

c. bírí+nîy+àa — bírínyàa

d. kíifá+nîy+àa — kíifányàa

e. záaká+nîy+àa — záakányàa

The rule of Short Vowel Deletion is stated roughly as follows:

(29) SHORT VOWEL DELETION

$$\underset{[-\text{low}]}{\breve{V}} \longrightarrow \emptyset \;/\; \breve{V} \begin{bmatrix} +\text{cons} \\ -\text{obs} \end{bmatrix} __ \; G$$

(where V̆ denotes a short vowel, G a glide, and where [-low] refers to height of articulation, not tone)

The feature complex [+cons, -obs] is used here to denote the consonants m, n, l, r. Independent motivation for this rule is seen from the following:

(30)

Masculine	Feminine		
a. bàaƙóo	bàaƙóo+aa	bàaƙúwáa	'stranger'
b. zàabóo	zàabóo+aa	zàabúwáa	'guinea fowl'
c. kàrée	kàrée+aa	kàryáa	'dog'
d. kútúrúu	kútúrúu+aa	kútúrwáa	'leper'
e. ƙánèe	ƙánòo+aa	ƙánwàa	'younger brother; younger sister'

In (30a,b), the feminine suffix -aa is added to the masculine nouns, the tone of the last syllable of the noun is copied onto -aa, and Glide Formation and Vowel Raising apply. Since these words contain the obstruents ƙ and b where the Short Vowel Deletion rule calls for non-obstruents, they do not undergo this rule. The feminines in (30c,d,e) are formed in the same manner, except that here the environment for Short Vowel Deletion is met, and so the forms *kàríyáa, *kútúrúwáa, and *ƙánùwàa are converted into kàryáa, kútúrwáa, and ƙánwàa.

Short Vowel Deletion must be restricted in some way, so as not to remove the penultimate vowel in words such as these:

(31) a. ƙànƙánùwáa 'small'

b. bàgúumáliyaa 'person from Gúumàl'

The restriction appears to be that a vowel is deleted only when the preceding syllables in the word are either all high or all low. An apparent counterexample to this formulation is máɗámfáríyáa, 'tick,' where all syllables preceding í are high and yet the rule does not apply. However, this word is an agent nominal, and as will shown at the end of this section, it has the form máɗàmfàríyàa at an earlier stage of the derivation. I will assume that Short Vowel Deletion applies at this earlier stage.

Two counterexamples for which I will not attempt an explanation here are àníyàa, 'effort,' and gàmúwáa, 'gathering.'

The words in (22), (23), (24), (25), and (30) together support the contention that the feminine suffix -aa gets its tone by copying that of the preceding syllable. Now consider the following:

(32) Masculine	Feminine		
a. béebée	béebée+aa	béebìyáa	'deaf mute'
b. àbóokíi	àbóokíi+aa	àbóokìyáa	'friend'
c. gàjéerée	gàjéerée+aa	gàjéerìyáa	'short'

The feminine in (32a) is formed like those in (23) (e.g., dóogóo, dóogúwáa), except that the final syllable of the masculine form becomes low in tone before the feminine suffix. Similarly, (32b,c) are formed along the lines of (30) (e.g., bàaǩóo, bàaǩúwáa), except that here, too, the tone of the syllable preceding the suffix -aa is low.

To account for this apparent exceptionality, I will claim that the masculine suffixes -ée and -íi have two underlying tones on them, a low followed by a high: -èé, -ìí. The feminine suffix -aa copies the last tone of the preceding syllable, giving:

(33) a. béebèé+áa

b. àbóokìí+áa

c. gàjéerèé+áa

Rule (15), Tone Deletion, gets rid of the second-to-last high tone, and the regular segmental rules produce the correct surface forms. In the mascuine, béebèé, àbóokìí, and gàjéerèé are realized with final high tones, by the Low-High Rule, (5).

The only plausible alternative to this proposal that is consistent with the treatment given to derived feminine forms here would maintain that the feminine suffix copies the high tone of the preceding syllable (e.g., béebée+áa), and that a subsequent

minor rule of tonal dissimilation, for which the words in (30) are marked, and which applies only to derived forms, lowers the tone of the syllable preceding a high-toned suffix. This proposal is the same as the one rejected in Section 4 in the treatment of nàawá and náasà, and is rejected here for the same reason. Given two proposals, one which marks an exception lexically in a way independently established for the grammar in question, another which requires the statement of an ad hoc minor rule, the evaluation procedure must choose the former.

It is interesting to note that if the Low-High Rule were held to apply cyclically below word level, the analysis which I have adopted would be impossible. (33a), béebèé+áa, for example, would become béebée+áa by the Low-High Rule before Tone Deletion could apply. The minor rule of tonal dissimilation, which the -èé analysis makes unnecessary, becomes necessary if the Low-High Rule applies cyclically below word level.

Finally, I wish to consider three different constructions in which the derivation of the feminine form from the masculine involves the same tonal change:

(34)

	Masculine	Feminine	
a. Group Affiliation Names	bàkàtáagùmíi	bàkàtáagúmìyáa	'person from Kàtáagùm'
b. Agent Nominals	má'àykàcíi	má'áykácìyáa	'worker'
c. Non-derived nouns	jínjírii	jínjírniyáa	'baby'

In the masculine forms, the tone of the pre-suffixal syllable is low, while in the feminine, the corresponding syllable is high. The suffix -ii is high in the masculine but low in the feminine. (In (34c), nîi appears in the place of îi in the feminine.) I propose that the unerlying tone of the masculine suffix -ii is low; in the masculine forms the tone of this suffix will be raised by the Low Tone Raising rule. In the feminine, the suffix -aa will copy the low tone of the masculine suffix. The forms will then look like this:

(35) a. bà + kàtáagùm + îi + àa

b. má + àykàc + îi + àa

c. jínjîr + nîi + àa

The suffix -àa will be raised by the Low Tone Raising rule.[10] Another tonal adjustment is necessary, since the low-toned syllables preceding îi or nîi are high in the feminine. This is accomplished by the following rule:

(36) TONAL DISSIMILATION

$$V \longrightarrow H \;/\; __\; L + \acute{a}a$$

The function of this rule is to raise the third-to-last tone when it precedes a low tone in a feminine word ending in -áa.[11] This is a strange rule, and I know of no independent justification for it. However, it must be a rule of Hausa, since there is no plausible alternative. One possibility that might be considered would involve regarding the morphemes kàtáagùm, 'àykàc, and jínjîr as

having the underlying forms:

(37) a. kàtáagúm

b. áykác

c. jínjír

In this case, rule (36) would not be needed, since the forms in (37) are as they appear in the feminine. Instead, a tone lowering rule would be needed to account for the masculine forms in (34). But such an analysis is impossible, because it entails postulating an incorrect underlying form in (37a). We know that kàtáagùm is the correct underlying form because it is the correct surface form,[12] and there is no known rule that could convert underlying *kàtáagúm into kàtáagùm.[13]

Thus I conclude that (36) is a rule of Hausa. This analysis provides additional evidence for the rules of Low Tone Raising and Tone Copying disucssed in earlier sections, and points up the only case of regressive tonal dissimilation operating within word boundaries that I know of.

NOTES

[1]This is a revised version of a paper delivered at the Conference on African Languages and Linguistics, University of Illinois, 24-25 April 1970. I am grateful to many of the participants in this conference for their helpful suggestions, and to Morris Goodman and Paul Kiparsky for discussion of earlier versions of this paper. Data is from the two Hausa dictionaries, Abraham and Bargery, from Kraft and Abubakar (1965), and from the following Hausas, who served as informants: Chaïbou Alassane and Yaou Na Atchi of Niger, and Isa Kurawa and A. Getso of Nigeria.

[2]The only exceptions I know of are yàayàa, 'how?,' and its dialectal variant, ʃàaʃàa. John Eulenberg (personal communication) has suggested that these are reduplicated forms, and thus might contain the word boundary, #, internally. In this case, they are not exceptions to rule (3).

[3]The format is from Parsons (1960).

[4]What is said about the genitival link must be extended to apply to the definite marker, ǹ. Since this introduces complications which have no relevance to the matter at hand, I will ignore it.

[5]Morris Goodman and Paul Schachter (personal communication) inform me that there is no distinction in Hausa between short u and short i in closed syllables, at least in the contexts discussed here. Therefore I will regard hàráamùn as hàráamìn.

[5a]It might be suggested that what really prevents líttáafîi from becoming *líttâ`f is a constraint on the occurrence of certain final consonants. However, the pair shàríifîi / shàrî`f shows that final f in a falling-toned syllable is permissible in Hausa.

[6]See Chomsky and Halle (1968: 249-52, 373).

[7]This rule apparently must be restricted so as not to apply to verbs, since Grade 1 and 4 forms such as <u>máɲtà</u> and <u>ɗáùkè</u> exist; alternatively, it might be possible simply to restrict this rule to apply only to derived forms.

The need for this restriction might be considered damning evidence against the rule as it now stands. One of the participants in the conference at which this paper was presented suggested that the generalization to be captured by a rule of Tone Deletion was that a consonant loses its tone when it becomes the onset of a syllable rather than the coda of its underlying syllable. In this vein, Paul Newman has privately suggested the following rough formulation of Tone Deletion:

$$\begin{bmatrix} -\text{voc} \\ +\text{tone} \end{bmatrix} \longrightarrow \begin{bmatrix} -\text{voc} \\ -\text{tone} \end{bmatrix} / __ \begin{bmatrix} +\text{voc} \end{bmatrix}$$

This proposal, besides being more plausible phonetically than the formulation presented in the text, avoids the need for the restriction cited above. It is not without its drawbacks, however. For one thing, it binds us to regarding tone as a phonological feature of some [+cons] segments. This situation, which may or may not turn out to be undersirable, is discussed inconclusively in the text. Furthermore, Newman's reformulation would not explain the tonal correspondence between <u>fàráɲs</u>, 'France,' and <u>fàránshìi</u>, 'France, French.' Instead, it would predict <u>fàráɲs + ìi</u> $\longrightarrow$ *<u>fàrânshíi</u>. If evidence were found for claiming that the noted tonal correspondence is regular in Hausa, then one might consider altering Newman's rule by adding an optional [-voc] segment:

$$\begin{bmatrix} -\text{voc} \\ +\text{tone} \end{bmatrix} \longrightarrow \begin{bmatrix} -\text{voc} \\ -\text{tone} \end{bmatrix} / __ \; ([-\text{voc}]) \; [+\text{voc}]$$

This would allow Tone Deletion to apply to /fàráńs + ìi/, but then it would be necessary to add the same restriction mentioned above for verbs like máǹtà and ɗáùkè.

At any rate, either proposal is compatible with the analysis in section 5. If Newman's formulation is correct, however, the treatment of naa, 'of,' as /nàá/ is probably wrong, and the discussion of word boundaries in section 4 is irrelevant.

[8]A partial account of these changes appears in Schuh (1968).

[9]Paul Newman (personal communication) has pointed out that the noun stems in (25) also differ from those in (26) in that the latter contain two consonants (or glides), while the former contain one or three. I cannot imagine why this correspondence should exist.

[10]Note that if Low Tone Raising applied cyclically below word level, (34a), for example, would become *bà+kàtáagùm+íi+àa, thereby complicating the analysis, if not making it completely impossible.

[11]The statement of this rule presupposes an analysis of the agent nominals that I will not bother to defend here. I believe that the verb root (e.g., àykàc in (35b)) has only one tone on it in derived constructions, and that this tone is copied onto all syllables after rules like (36) have applied. If this is wrong, (36) will have to be modified slightly.

[12]Abraham (1962) actually gives kàtáagúm, but A. Getso, a Hausa from Nigeria who knows the village of Kataagum well, maintains that it is kàtáagùm.

[13]The other logical possibility that one might consider is that underlying /kàtáagùm/ is changed to kàtáagúm, and then changed back to kàtáagùm, in the masculine form of this construction. But it is difficult to see how such a proposal could be motivated.

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